

REMARKS

Claims 1-4 and 13-30 are pending in this application with claims 17-30 withdrawn. While we disagree with the objection to the specification, the specification has been amended to expedite prosecution by obviating objections by the Examiner. Reconsideration in view of the above amendments and following remarks is respectfully requested.

1. Specification

The Office Action objects to the specification. Applicants submit that the amendments above obviate the objection. Applicants further submit that the specification amendments are fully supported by FIG. 4 as originally filed and the recitation of page 5, lines 18-22 is merely an additional description of the embodiment illustrated in FIG. 4. Further, the specification amendments made in the previous Response do not introduce new matter, but merely further describes features illustrated in the embodiment of FIG. 4. Withdrawal of the objection is respectfully requested.

2. 35 U.S.C. §102(e) and 35 U.S.C. §103(a)

The Office Action rejects claims 1-4 and 13-16 under 35 U.S.C. §102(e) as being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as being obvious over *Dodelet et al.* (U.S. Patent No. 6,887,451, hereinafter referred to as "*Dodelet*").

As discussed in our previous Response dated October 17, 2006, Applicants respectfully submit that *Dodelet* discloses nanotubes that are quite straight and very clean (see col. 3, lines 55-56 of *Dodelet*). However, as discussed in the previously

attached Declaration, illustrated in revised FIG. 4, and discussed in the currently attached Declaration, the claimed nanotubes are branched carbon nanotubes that include branched sections 20 which branch off from a main "trunk" section 21 with dispersed catalytic metal particles 22 on both the main carbon nanotube 21 and the branched carbon nanotubes 20. *Dodelet* discloses that nanotubes can be made "tortuous" but fails to disclose or suggest branched carbon nanotubes.

The Office Action states that "the formation of some branched carbon nanotubes in the final MWCNTs would have been essentially certain." See page 2 of the Office Action (emphasis added). However, *Dodelet's methods are different* from those recited in the application, and are designed to avoid tortuous nanotubes without any mention or discussion of any formation of branched nanotubes, which would arguably have been detrimental to the desires of *Dodelet* due to their lack of "straightness."

As discussed in the attached Declaration, the claimed branched carbon nanotubes are a result of the use of a reducing gas, such as H_2 , being supplied for an extended period of time during the supply of carbon source gas in order to synthesize the branches as claimed. On the other hand, *Dodelet* utilizes $Ar + H_2 + C_2H_4$ gas during the entire length of the synthesis of the carbon nanotubes therein. See *Dodelet*, col. 3, lines 10-12. Therefore, the methods are different and one of ordinary skill in the art would not find branched carbon nanotubes anticipated or obvious in view of *Dodelet*.

Furthermore, *Dodelet* uses Co and Ni as catalysts for growth of CNT. Because Co and Ni are easily oxidized, the oxidized Co and Ni cannot act as catalysts for growth for a CNT. Therefore, *Dodelet* utilizes $Ar + C_2H_4$ including H_2 in

order to prevent Co and Ni from being oxidized. Thus, the H₂ in *Dodelet* cannot act as an etching agent, which exposes the catalysts so that the exposed catalyst can become nuclei from which CNT branches can grow off from. See the specification of the present application.

While the general gases and temperatures used in the claimed invention and *Dodelet* are similar, *Dodelet* does not use the same process, and therefore one of ordinary skill in the art would not expect branched CNTs. Applicants submit that *Dodelet* teaches away from a branched CNT, and uses different methods of forming CNTs. In other words, as stated by *Dodelet*, straight, clean carbon nanotubes and not tortuous (or probably branched) carbon nanotubes are desired as a result of *Dodelet's* combination of time (*e.g.*, 1 minute) with the catalyst (*e.g.*, Fe, Co and Ni), temperatures and specific chemistry of the gas (90% Ar, 5% H₂, and 5% C₂H₂).

As a result of the process described in the present application, the claimed branched carbon nanotubes would differ from the "straight" or "tortuous" carbon nanotubes described in *Dodelet*. The claimed branched carbon nanotubes include "splintered" portions or "tree-branches" from a main "trunk" section, rather than the curled or "tortuous" single "trunk" type carbon nanotubes that *Dodelet* is trying to reduce in favor of straight carbon nanotubes.

For at least the reasons set forth above, Applicants respectfully submit that for at least the reasons set forth above, as well as the reasons set forth in the Declaration and the previous Response of October 17, 2006, that claim 1 is allowable. Claims 2-4 and 13-16 depend from claim 1, and are allowable for at least the same reasons. Withdrawal of the rejection is respectfully requested.

3. Restriction Requirement

Applicants respectfully submit that claims 17 and 23 depend from claim 1, and therefore upon allowance of claim 1, Applicants respectfully request rejoinder of claims 17-23, which are directed to electrodes and fuel cells which include the carbon nanotubes as recited in claim 1.

Therefore, Applicants respectfully request rejoinder of claims 17-30.
Withdrawal of the restriction requirement is respectfully requested.

4. Request for Interview

Applicants respectfully request a personal interview if this application is not considered in condition for allowance. The Examiner is requested to call 703-838-6594 to schedule an interview at the Examiner's earliest convenience.

5. Conclusion

Applicants invite the Examiner to contact Applicants' representative at the telephone number listed below if any issues remain in this matter, or if a discussion regarding any portion of the application is desired by the Examiner.

In the event that this paper is not timely filed within the currently set shortened statutory period, Applicants respectfully petition for an appropriate extension of time. The fees for such extension of time may be charged to our Deposit Account No. 02-4800.

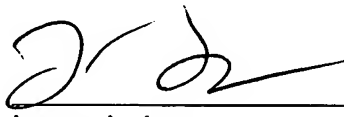
In the event that any additional fees are due with this paper, please charge
our Deposit Account No. 02-4800.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: April 30, 2007

By: _____



Laura L. Lee
Registration No. 48752

P.O. Box 1404
Alexandria, VA 22313-1404
703 836 6620